ARCHIVES OF BUDO
Journal of Innovative Agonology

e-ISSN: 1643-8698

*Section:* ***HEALTH THROUGH COMBAT SPORT & SURVIVAL EXERCISES*** *Original Paper*

# The mediating effect of challenge on the relationship between competition preparation, deliberate practice, and goal commitment in combat sport athletes

**Hyun-Ryun Kim** [1ACD], **Youngjun Hong** [2ACD*], **Seung-Hwan Woo** [3BCD*], **Sangil Lee** [4BE], **Jae-Pil Seo** [5BE]

[1] Department of Physical Education, Woosuk University, Republic of Korea;
[2] Department of Sport for All, Korea National Open University, Republic of Korea;
[3] College of Convergence in Culture, U1 University, Republic of Korea;
[4] Department of Leisure and Sport Studies, Pai Chai University, Republic of Korea;
[5] Sports & Leisure Studies, Gimcheon University, Republic of Korea;

*** Corresponding author:** Youngjun Hong, Department of Sport for All, Korea National Open University, Republic of Korea; hong8939@woosuk.ac.kr / Seung-Hwan Woo, College of Convergence in Culture, U1 University, Republic of Korea; woosh0916@naver.com

**Authors' Contribution:**

A Study Design
B Data Collection
C Statistical Analysis
D Manuscript Preparation
E Funds Collection

Received: date: 12.08.2025
Accepted: date: 10.10.2025
Published: date: 19.10.2025

**Abstract:**

**Background and Study Aim:** Athletes in combat sports compete under intense physical and psychological pressure. Prior studies highlight the importance of psychological skills such as challenge orientation, deliberate practice, and goal commitment. However, limited research has explored how these factors interact with athletes' preparation for competition. The cognitive goal of this research is knowledge about the mediating role of the sense of challenge in the relationships among multi-faceted competition preparation, deliberate practice, and commitment to achieving the goal.

**Material and Methods:** Participants were 327 athletes (male = 212, female = 115) from boxing, judo, taekwondo and wrestling disciplines, recruited from South Korea. A structured questionnaire measured four variables, and data were analysed using descriptive statistics, correlation analysis, and structural equation model.

**Results:** greater competition preparation was associated with a stronger sense of challenge, which in turn predicted higher levels of deliberate practice and goal commitment. The sense of challenge also mediated the relationship between competition preparation and both outcome variables.

**Conclusions:** These findings suggest that fostering a challenge-oriented mind set may enhance athletes' engagement in purposeful training and strengthen their commitment to goals. This study offers practical insights for coaches seeking to optimize performance in combat sports settings.

**Keywords:** challenge, multidimensional competition preparation, structural equation modelling

## Dictionary:

**Hand-to-hand combat –** is a physical confrontation or sports between individuals at close range without the use of weapons, relying on striking, grappling, or other direct bodily techniques to subdue an opponent [38].

**Combat sport –** *noun* a sport in which one person fights another, e.g. wrestling, boxing and the martial arts [39].

**Competition** – *noun* a contest or event in which individuals or teams strive against each other to achieve superiority or a specific goal, often under rules and time constraints in sport settings [39].

**Preparation** – *noun* the process of getting ready mentally, physically, and strategically for an upcoming performance or event, especially in the context of training and planning in sport [6].

**RMSEA** (Root Mean Square Error of Approximation) – in structural equation modeling, this is one of the indicators of model fit. Unlike other fit indicators in RMSEA, the lower the index level, the better the model fit, not the other way around. It is assumed that an RMSEA value below 0.05 indicates very good model fit, while an RMSEA value below 0.10 indicates good model fit [56].

## 1. Introduction

**CFI (Comparative Fit Index)** – is one of the measures of model fit in SEM (Structural Equation Modeling) analysis. It assesses the quality of fit while taking into account model complexity and sample size.

**CFI / TLI (Path Analysis / Structural Equation Modeling / SEM)** – coefficients measuring the fit of a structural model to the data. The closer to 1, the better. The threshold value for accepting a model is 0.9.

**SRMR (Standardized Root Mean Square Residual)** is a measure of model fit in SEM (Structural Equation Modeling) analysis. SRMR reflects the average difference between the predicted and observed correlations of variables in the model. It is a residual index (similar to regression residuals, though mathematically more complex), meaning that the smaller the SRMR value, the

Racket sports (e.g., tennis) or field sports (e.g., soccer, rugby), combat sports are characterized by highly dynamic (sometimes aggressive) interactions in which two athletes determine victory or defeat through direct physical techniques such (in combat sports) as striking, kicking, grappling, and throwing, all within predefined rules. Moreover, most combat sports (e.g., judo, boxing, taekwondo) involve relatively short competition durations (rounds in boxing or taekwondo, judo clash, however, each winner of the eliminations and defeated in the semi-finals during judo and taekwondo tournaments fight multiple times in one day), making pre-competition preparation a critical factor for success [1]. Physical factors such as flexibility, muscular strength, cardiovascular endurance, and agility [2], along with mental preparation – including goal setting, imagery, confidence, and anxiety regulation – are essential for achieving optimal performance [3]. These multifaceted elements are known to be closely associated with athletes' motor skills and competitive performance [4, 5]. As a result, the importance of comprehensive competition preparation – encompassing psychological, physical, emotional, and environmental factors – has come to the forefront [6].

Bae et al. [6] conceptualized multidimensional competition preparation for athletes in combat sports. This framework includes psychological, physical, emotional, informational, and environmental preparation. The authors posited that such comprehensive preparation fosters an ideal state conducive to optimal performance. Indeed, an ideal preparatory state [7, 8] is closely related to achieving peak physical and competitive performance. Within this context, multidimensional preparation increases the likelihood of athletes focusing on their tasks and embracing challenges in pursuit of success [9]. Drawing on cognitive appraisal theory, Lazarus and Folkman [10] argued that individuals interpret competitive situations in diverse ways. Athletes who perceive themselves as well-prepared are more likely to appraise such situations positively, whereas those who feel underprepared tend to experience fear and anxiety. Furthermore, empirical evidence suggests that athletes with higher levels of competition preparation tend to respond to threats with increased challenge-seeking behaviours [11, 12].

In sport, challenge refers to an athlete's psychological tendency to face difficult tasks or novel situations actively, viewing them as opportunities for growth and learning rather than as threats [13]. When the difficulty of a task aligns with an athlete's perceived competence, it can lead to experiences of flow and a desire to pursue even greater challenges [14, 15]. This desire to challenge oneself is directly linked to long-term development and improved performance. Additionally, challenge facilitates positive emotions and enhances repeated practice, particularly by motivating athletes to identify and address their weaknesses [16]. In this regard, challenge serves as a key factor that triggers deliberate practice – a form of structured and effortful training aimed at skill improvement [17,18,16].

Deliberate practice involves systematic planning and sustained effort. It refers to a purposeful and methodical behaviour aimed at correcting one's deficiencies [19, 16]. Athletes who engage in deliberate practice not only persevere through demanding training but also exhibit a proactive attitude [20]. While athletes who engage in deliberate practice are able to adapt and apply various skills in competition, those who do not often struggle to respond effectively under pressure. Multiple studies [1, 6] support the idea that ideal states of preparation enhance the likelihood of deliberate

practice. Horrocks et al. [19], in a longitudinal study of elite athletes, found that maintaining high-level performance was strongly associated with consistent training, goal clarity, and dedicated preparation routines. These findings offer empirical support for the link between competition preparation and deliberate practice. In fact, well-prepared athletes tend to value structured and systematic training processes [20]. Thus, achieving excellence in competition requires both rigorous preparation and consistent deliberate practice. Recognizing this, there is a growing interest in practical strategies to enhance performance and training routines, highlighting the need for ongoing research in this area.

Furthermore, the concepts of competition preparation and challenge are closely tied to goal commitment. Goal commitment refers to an individual's psychological engagement and determination to achieve self-set goals [21]. It involves focusing mental and physical energy on the goal-attainment process. Committed individuals strive to achieve their goals without compromising, whereas less committed individuals are more likely to abandon their efforts when faced with difficulties [22]. Given these characteristics, the concept of challenge – which involves immersive effort in the face of adversity – may significantly aid athletes in combat sports in pursuing their performance goals. Although research on competition preparation and challenge is still limited, it is evident that elite athletes commonly demonstrate persistence in their preparatory routines and show high levels of commitment to their goals [23, 24]. Consequently, there is a need to explore the mechanisms through which competition preparation and challenge operate in the field of sport science.

Based on previous studies and theoretical frameworks, competition preparation, challenge, deliberate practice, and goal commitment are expected to be closely interrelated. This study seeks to examine these relationships, specifically within the context of athletes in combat sports, thereby offering valuable insights. First, the study aims to empirically validate the previously conceptualized multidimensional competition preparation model [25, 1] using quantitative data. This will provide a useful framework for athletes to assess their readiness and understand the importance of preparation in fostering deliberate practice and goal commitment. Second, this study explores the mediating role of challenge in the relationship between competition preparation and both deliberate practice and goal commitment. This focus is expected to yield practical implications for supporting athletes in improving their skills and achieving their goals through repeated and structured training efforts.

The cognitive goal of this research is knowledge about the mediating role of the sense of challenge in the relationships among multi-faceted competition preparation, deliberate practice, and commitment to achieving the goal.

## 2. Materials and Methods

### Participants

To achieve the objectives of this study, the target population comprised student-athletes registered in combat sports under the Korea Olympic Committee as of 2025. Data were collected between February and April 2025 using a convenience sampling method. Participants were recruited from middle and high schools (13 to 18 years old) located in Seoul, Gyeonggi, and Incheon regions. Prior to data collection, the research team contacted school athletic coaches and administrators to explain the study's purpose and obtain prior consent. Upon receiving institutional approval, the researchers visited each school team, provided a detailed explanation of the study to

potential participants, and collected responses from 350 student-athletes who voluntarily agreed to participate. After excluding 13 incomplete or invalid responses, a total of 327 data (male = 212, female = 115) were included in the final analysis. The sample consisted of athletes participating in taekwondo ($n$ = 130), wrestling (n = 97), judo ($n$ = 86), and boxing ($n$ = 14). The participants' mean age was 15.8 years ($SD$ = 1.22), and their average athletic experience was 4.2 years ($SD$ = 1.50). To ensure research ethics, all responses were collected anonymously, and participants were fully informed about the confidentiality and voluntary nature of their involvement.

**Measures**

To address the research objectives, a structured questionnaire was adapted from previous validated studies. Prior to its administration, content validity was assessed by a panel of three experts, including one professor specializing in sport psychology, one in measurement and evaluation, and two combat sports coaches. The finalized instrument consisted of 46 items: 4 items on demographic characteristics, 25 on competition preparation, 5 on challenge, 6 on deliberate practice, and 5 on goal commitment. All items were rated on a 5-point Likert scale ranging from 1 ('Strongly disagree') to 5 ('Strongly agree').

To evaluate the construct validity and internal consistency of the instruments, confirmatory factor analysis (CFA) using the maximum likelihood (ML) estimation method and reliability analysis using Cronbach's α were conducted. Model fit was assessed according to the following thresholds: TLI and CFI >0.90, RMSEA <0.08, and SRMR <0.08 [26]. A Cronbach's α value of 0.70 or higher was considered indicative of acceptable internal consistency [27].

*Multidimensional Assessment of Preparation for Sport Competition*

Competition preparation was measured using the Multidimensional Assessment of Preparation for Sport Competition (MAPSC) developed by Bae et al. [6]. This instrument includes five subscales: physical, psychological, emotional, environmental, and informational preparation with five items each, totalling 25 items. During CFA, one item (a10) was removed due to poor factor loading. The modified model demonstrated acceptable fit: $x^2$ = 711, $df$ = 242, CFI = 0.920, TLI = 0.909, SRMR = 0.057, RMSEA = 0.077. The subscale reliabilities were as follows: psychological preparation 0.877, physical preparation 0.835, emotional preparation 0.883, environmental preparation 0.942, and informational preparation 0.873.

*Challenge*

Challenge was assessed using a revised version of the Student Perceptions of Classroom Quality (SPOCQ) scale originally developed by Gentry and Owen [28]. The modified version, validated for use with Korean athletes [29, 30], comprises 6 items measuring a single factor. Based on CFA results, one item (b1) was removed due to poor validity. The revised model showed good fit: $x^2$ = 12.5, $df$ = 5, CFI = 0.994, TLI = 0.987, SRMR = 0.012, RMSEA = 0.067. Internal consistency was high, with a Cronbach's $\alpha$ of 0.921.

*Deliberate practice*

Deliberate practice was measured using the Korean version of the scale developed by Vallerand et al. [31], translated and validated by Yang [32]. This scale has demonstrated strong psychometric properties in Korean athletic contexts (Sim & Seo, [30]). It consists of 6 items forming a single factor. One item (c2) was excluded based

on CFA results. The final model showed acceptable fit: $x^2 = 13.4$, $df = 5$, CFI = 0.989, TLI = 0.977, SRMR = 0.018, RMSEA = 0.071. The reliability was 0.866.

*Goal Commitment*

Goal commitment was measured using the Korean version of the Goal Commitment (GC) scale originally developed by Klein et al. [33] and adapted by So [34]. This version has been widely used and validated within Korean sports settings. The scale consists of 5 items under a single factor. Based on CFA, one item (d3) was removed due to poor validity. The revised model demonstrated excellent fit: $x^2 = 98.1$, $df = 5$, CFI = 0.990, TLI = 0.969, SRMR = 0.012, RMSEA = 0.013. Internal consistency was 0.933.

**Procedure**

Prior to data collection, approval was obtained from the university's institutional review board (IRB), and all participants were informed of the study's purpose, confidentiality policy, and their right to withdraw at any time without penalty. After obtaining informed consent, the survey was administered in person at training centres and gyms located in Seoul, Gyeonggi, and Jeolla provinces. To ensure standardization and minimize response bias, trained research assistants provided a brief explanation of the questionnaire items and remained present while participants completed the survey. Athletes were asked to complete the questionnaire individually in a quiet setting either before or after training sessions. Each survey took approximately 15 to 20 minutes to complete. Upon completion, the responses were immediately collected and screened for missing values or response irregularities. A total of 327 valid responses were included in the final analysis.

**Decomposition of the cognitive research goal into hypotheses**

The specific hypotheses are as follows: H1. Competition preparation will positively influence challenge; H2. Competition preparation will positively influence deliberate practice; H3. Competition preparation will positively influence goal commitment; H4. Challenge will positively influence deliberate practice; H5. Challenge will positively influence goal commitment; H6. Challenge will mediate the relationship between competition preparation and deliberate practice; H7. Challenge will mediate the relationship between competition preparation and goal commitment.

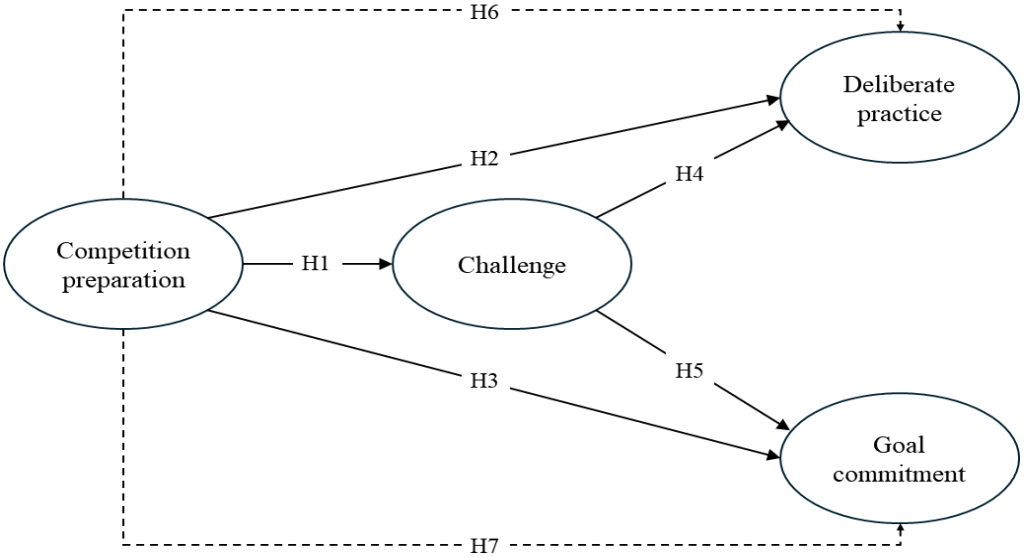


**Figure 1.** Hypothesized research model (H refers to hypothesis)

### Statistical analysis

The collected data were analysed using jamovi version 2.6 and AMOS version 23.0. The level of statistical significance was set at a = 0.05. The data analysis procedures were as follows. First, descriptive statistics (frequency analysis and normality tests) were conducted to examine the participants' demographic characteristics. For assessing normality, the thresholds for skewness (±3) and kurtosis (±7) were applied to determine the appropriateness of the data distribution [26].

Second, to assess the validity and reliability of the measurement tools, confirmatory factor analysis (CFA) using the maximum likelihood estimation method was performed, along with reliability testing based on Cronbach's α coefficients. The model fit indices for CFA were evaluated based on the following criteria: CFI and TLI ≥0.90, and RMSEA and SRMR ≤0.08 [26]. Internal consistency was considered acceptable when Cronbach's a exceeded 0.70 [27].

Third, correlation analysis was performed to assess discriminant validity among the main variables, and structural equation modeling (SEM) was conducted to test the

hypothesized causal relationships. The model fit was evaluated using the same thresholds as in the CFA (CFI and TLI ≥0.90, RMSEA and SRMR ≤0.08). Prior to the SEM analysis, the validity of the measurement model was verified, as recommended by Anderson and Gerbing [35].

Fourth, to examine the mediating effect of challenge between competition preparation and both deliberate practice and goal commitment, bootstrapping procedures were conducted with 2,000 resamples. The statistical significance of the indirect effects was determined based on 95% bias-corrected confidence intervals [36].

Statistical analysis includes the following indicators: chi-squared test is a statistical hypothesis test used in the analysis of contingency tables when the sample sizes are large ($x^2$); confidence interval (*CI*); degrees of freedom (*df);* empirical correlation coefficient (*r*); frequency (n); significance level, probability (*p*); ); standard deviation (*SD* or ±); standard error (*SE*); standardized regression coefficient ($\beta$);

Based on the thresholds suggested by Kline [26], namely skewness ±3 and kurtosis ±7 all variables met the assumption of normality.

## 3. Results

### Descriptive statistics

The mean values ranged from 3.432 to 4.020, with the physical preparation subscale of competition preparation showing the lowest mean and environmental preparation the highest. Standard deviations ranged from 0.651 to 0.822. The skewness values ranged from −0.010 to −0.311, and kurtosis values ranged from −0.201 to −0.893 (Table 1).

**Table 1**. Descriptive statistics of all sub-factors (ordinal variable: from highest to lowest arithmetic mean of sub-factor).

| Sub-factor | Mean | SD | Skewness | Kurtosis |
|---|---|---|---|---|
| 1. Environmental | 4.020 | 0.741 | −0.235 | −0.893 |
| 2. Goal commitment | 3.940 | 0.807 | −0.311 | −0.365 |
| 3. Psychological | 3.804 | 0.755 | −0.034 | −0.690 |
| 4. Deliberate practice | 3.802 | 0.651 | 0.206 | −0.786 |
| 5. Challenge | 3.766 | 0.761 | 0.074 | −0.589 |
| 6. Emotional | 3.792 | 0.751 | −0.016 | −0.725 |
| 7. Informational | 3.682 | 0.793 | 0.017 | −0.485 |
| 8. Physical | 3.432 | 0.822 | −0.010 | −0.201 |

### Correlation Analysis

The results revealed that all subfactors were significantly and positively correlated at the $p<0.01$ level. Specifically, the lowest correlation was found between environmental preparation and deliberate practice ($r$ = 0.287), while the highest correlation was observed between challenge and goal commitment ($r$ = 0.728). Furthermore, since none of the correlation coefficients exceeded 0.800, multicollinearity was not considered a concern (Table 2).

**Table 2**. Bivariate correlation coefficients of all sub-factors.

| Sub-factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Environmental | **1** | | | | | | |
| 2. Goal commitment | 0.562** | **1** | | | | | |
| 3. Psychological | 0.575** | 0.655** | **1** | | | | |
| 4. Deliberate practice | 0.287** | 0.460** | 0.447** | **1** | | | |
| 5. Challenge | 0.548** | 0.728** | 0.700** | 0.557** | **1** | | |
| 6. Emotional | 0.705** | 0.629** | 0.646** | 0.400** | 0.652** | **1** | |
| 7. Informational | 0.630** | 0.565** | 0.665** | 0.390** | 0.594** | 0.675** | **1** |
| 8. Physical | 0.388** | 0.487** | 0.627** | 0.414** | 0.497** | 0.584** | 0.607** |

**$p<0.01$

### Structural Equations Model

The results indicated a good model fit: $x^2 = 444.406$, $df = 146$, TLI = 0.938, CFI = 0.947, RMSEA = 0.079, and SRMR = 0.039. The standardized factor loadings of the latent variables on the observed indicators were all above 0.696, demonstrating strong explanatory power for the measurement items and satisfying the recommended criteria. The exogenous variable, competition preparation, had significant positive effects on challenge ($\beta = 0.809$, $p<0.001$), deliberate practice ($\beta = 0.371$, $p<0.001$), and goal commitment ($\beta = 0.292$, $p<0.001$). The endogenous mediator variable, challenge,

also had significant positive effects on deliberate practice ($\beta = 0.589$, $p<0.001$) and goal commitment ($\beta = 0.509$, $p<0.001$) (Table 3, Figure 2).

**Table 3**. Estimates and standardized estimates of direct paths (H hypotheses).

| H | Direct paths | | | B | $\beta$ | SE | t |
|---|---|---|---|---|---|---|---|
| H1 | competition preparation | → | challenge | 0.903 | 0.809 | 0.064 | 14.047*** |
| H2 | competition preparation | → | deliberate practice | 0.450 | 0.371 | 0.093 | 4.860*** |
| H3 | competition preparation | → | goal commitment | 0.331 | 0.292 | 0.085 | 3.879*** |
| H4 | challenge | → | deliberate practice | 0.598 | 0.589 | 0.080 | 7.451*** |
| H5 | challenge | → | goal commitment | 0.554 | 0.509 | 0.083 | 6.641*** |

***$p<0.001$

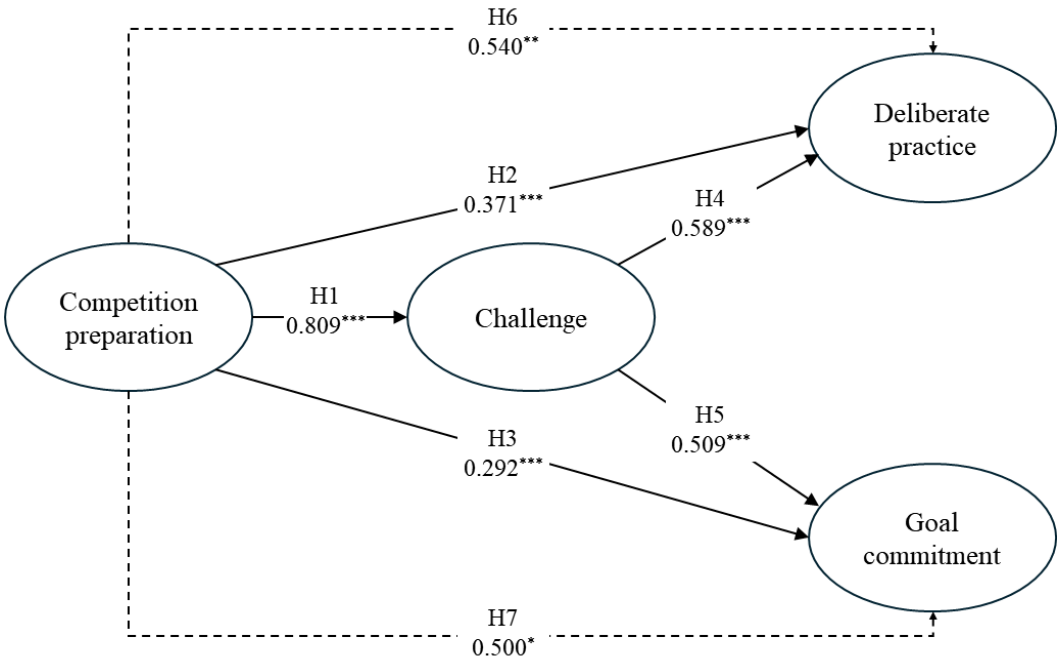


**Figure 2.** Tested research model (*$p<0.05$, **$p<0.01$, ***$p<0.001$)

### Mediation effects

The challenge significantly mediated the relationship between competition preparation and deliberate practice, thereby supporting Hypothesis 6. In addition, challenge also showed a statistically significant mediating effect in the relationship between competition preparation and goal commitment, supporting Hypothesis 7. In both cases, the indirect effect was considered significant, as the 95% confidence interval did not include zero (Table 4).

**Table 4.** The mediation effects of challenge (H hypotheses).

| H | Indirect paths | Indirect effect | SE | 95% CI | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| H6. | CP → challenge → deliberate practice | 0.540** | 0.262 | 0.344 | 0.598 |
| H7. | CP → challenge → goal commitment | 0.500* | 0.178 | 0.475 | 0.581 |

*p<0.05, **p<0.01; *Note*. CP refers to competition preparation

## 4. Discussion

These findings suggest that competition preparation functions as a key antecedent variable influencing challenge, deliberate practice, and goal commitment. Furthermore, challenge appears to be a critical explanatory variable for both deliberate practice and goal commitment. In summary, competition preparation serves as a precursor to challenge, deliberate practice, and goal commitment, while challenge positively contributes to both deliberate practice and goal commitment, while challenge positively contributes to both deliberate practice and goal commitment. Based on these results, further analysis is needed to verify the statistical significance of the mediating effects [36]. These findings indicate that athletes' thorough competition preparation can enhance their sense of challenge, which in turn increases their engagement in deliberate practice and strengthens their goal commitment.

For combat sport athletes who must perform at their best within a relatively short timeframe, rigorous preparation is a decisive factor in competition outcomes. Despite its importance, current practice still tends to emphasize mainly physical aspects. The concept of multidimensional competition preparation offers a valuable approach to addressing this limitation by encompassing psychological, physical, emotional, environmental, and informational factors. Such comprehensive preparation places athletes in an optimal state ahead of intense competition. Furthermore, competition preparation is expected to play a crucial role by fulfilling athletes' desire for challenge and fostering tendencies toward deliberate practice and goal commitment.

Based on data collected from 327 athletes, structural equation modelling and mediation analyses were conducted. The research model demonstrated excellent fit indices, and all seven direct and indirect pathways were statistically significant.

The paths from competition preparation to challenge and deliberate practice were positively significant. These findings suggest that an ideal preparatory state for peak performance in combat sports induces both a sense of challenge and engagement in deliberate practice. This is consistent with Nicholls and Polman's [11] findings that athletes' competition preparation and positive stress coping strategies elicit challenge. Additionally, Lazarus and Folkman's [10] cognitive appraisal theory provides a theoretical foundation for understanding the path from competition preparation to challenge. According to this theory, athletes encounter stressful competitive situations and appraise their readiness and capabilities; when perceived as manageable ("can do"), a sense of challenge arises [9]. Conversely, appraising the

situation as threatening induces fear and anxiety. Thus, athletes with a high level of perceived preparation are more likely to perceive challenge, whereas those perceiving insufficient preparation tend to experience fear and anxiety. Consequently, coaches should adopt a multidimensional perspective to evaluate athletes' readiness, providing varied feedback to promote challenging decision-making and performance.

In line with previous studies [1, 6], this research also confirmed that competition preparation promotes deliberate practice among combat athletes. The results resonate with Horrocks et al.'s [19] longitudinal observation of Gery Neville, a key player during Manchester United's golden era. Neville maintained elite performance by consistently setting clear goals and diligently preparing cognitively, physically, and situationally. He remained focused on repetitive routines and training processes, engaging in planned and structured deliberate practice. Furthermore, individuals achieving remarkable success across fields have emphasized thorough preparation and intentional practice aimed at improving their weaknesses [20]. These findings highlight that consistent routines and practice are fundamental starting points for achieving excellence.

The study also found a positive effect of competition preparation on goal commitment. Previous longitudinal studies of elite Korean athletes [23, 24] similarly emphasize the importance of thorough preparation and show that athletes tend to increase their immersion in pursuing self-set goals. Foran [7] argued that athletes' perceived ideal preparation is strongly correlated with peak performance, supporting the pathway from competition preparation to goal commitment. However, realizing these findings in practice demands dedicated effort from both coaches and athletes. When appropriate tasks are assigned, athletes tend to reject compromise and persist in their efforts to achieve goals [21]. Therefore, coaches should focus not only on outcome-oriented goals such as winning but also on fostering goal immersion by providing individualized, suitable tasks that focus athletes' mental and physical energies. This process requires careful observation and objective evaluation of athletes' skills and levels to assign appropriate challenges.

A particularly notable finding was the role of challenge. Challenge positively influenced both deliberate practice and goal commitment and mediated the relationships between competition preparation and these outcomes. Challenge evokes athletes' drive to engage actively in training and competition, which aligns with previous research reporting its facilitative role in promoting deliberate practice [18, 17, 16]. For practical application, Vella et al.'s [37] study offers insights into prerequisites for eliciting challenge. They emphasized the necessity of providing appropriate tasks and rewards to stimulate athletes' challenge drive. These tasks must be realistically achievable; otherwise, athletes risk losing motivation due to perceived unattainable goals. Coaches should therefore employ strategies that assign suitable tasks and incentives to foster athletes' challenge and motivation, ultimately sustaining deliberate practice.

Sustaining challenge is critical because it underpins athletes' goal commitment driven by positive desire. Altay et al. [21] found a significant relationship between challenge and goal commitment, supporting this study's results. Positive emotions and a sense of achievement accompanying goal pursuit enhance challenge, which in turn maintains immersion. Combat athletes face intense pressure to perform optimally within limited time, often experiencing stress and anxiety before competition. However, interpreting such stress as a challenge facilitates goal commitment. Here,

the role of comprehensive competition preparation is pivotal, as athletes who are thoroughly prepared psychologically, physically, emotionally, environmentally, and informationally achieve an ideal state that promotes systematic, planned practice and goal immersion.

Overall, the findings provide valuable insights for practitioners in competitive sports settings, emphasizing the importance of multidimensional preparation and the fostering of challenge to enhance athletes' deliberate practice and goal commitment.

## 5. Limitations and future direction

Several suggestions for future research arise from this study. First, since the current research was limited to combat sport athletes residing in South Korea, future studies should expand the participant pool and geographic scope to enhance generalizability. Second, as this study employed a cross-sectional design focusing solely on competition preparation, challenge, deliberate practice, and goal commitment, future research would benefit from longitudinal or qualitative approaches and the application of diverse methodologies to deepen understanding. Third, given that research on competition preparation is relatively recent, further studies exploring additional variables are necessary to provide more practical implications for sports settings. Through such efforts, future research can offer various useful indicators to improve practical application in the field and serve as objective data for coaches to systematically assess athletes' readiness prior to competition.

We have omitted from this discussion the important issue of the unique mission of combat sports. Every combat sport is also a form of self-defense [40], which is crucial in times of brutalization of interpersonal relations. Combat sports vary in terms of the permissible forms of direct action on the opponent's body, and the consequences are strongly related to the methods of active self-defense against a potential aggressor [41-49]. According to the research of Hofman and Collingwood [50], approximately 40% of interventions involving direct contact between a security officer and a criminal at the end of the previous century lasted approximately 2 minutes. The closest approximation to this model of intervention time, where hand-to-hand combat skills are key, is the duration of a round in boxing, taekwondo, and wrestling [51-55].

## 6. Conclusion

This study examined the mediating role challenge in the relationships among perceived competition preparation, deliberate practice, and goal commitment in combat sport athletes. Findings indicated that competition preparation positively influenced deliberate practice and goal commitment, while challenge significantly predicted both variables. Moreover, challenge mediated the relationship between competition preparation and deliberate practice, exerting a significant effect along the pathway to goal commitment. In conclusion, achieving superior performance in competition requires a rigorous and multidimensional preparation process. Ideal readiness is not solely physical but encompasses psychological, emotional, environmental, and informational aspects. Such comprehensive preparation fosters a sense of challenge even amid pre-competition pressures, enhancing the quality of repeated practice. At the same time, it facilitates athletes' immersion in their goals, ultimately contributing to outstanding performance outcomes.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy issues.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Woosuk University (IRB No. WS-2025-14).

**Conflicts of Interest:** The authors did not receive support from any organization for the submitted work.

**Financial support:** The authors declare no conflicts of interest.

## References

1. Bonk D, Tamminen KA. Athletes' perspectives of preparation strategies in open-skill sports. J Appl Sport Psychol 2022; 34(4): 825-45
2. Schuster J, Howells D, Robineau J, et al. Physical-preparation recommendations for elite rugby sevens performance. Int J Sports Physiol Perform 2018; 13(3): 255-67
3. Hardy L, Jones G, Gould D. Understanding psychological preparation for sport: Theory and practice of elite performers. Chichester: John Wiley & Sons; 2018
4. Perry IS, Katz YJ. Pre-performance routines, accuracy in athletic performance and self-control. Athens J Sports 2015; 2(3): 137-52
5. Woods CT, Rothwell M, Rudd J, et al. Representative co-design: Utilising a source of experiential knowledge for athlete development and performance preparation. Psychol Sport Exerc 2021; 52: 101804
6. Bae JS, Sim YK, Seo EC et al. Multidimensional assessment of preparation for sport competition (MAPSC): Psychometric properties and initial validation among Korean student-athletes in combat sport. Meas Phys Educ Exerc Sci 2024; 28(4): 360-76
7. Foran B. High-performance sports conditioning. IL: Human Kinetics; 2001
8. Ohuruogu B, Jonathan UI, Ikechukwu UJ. Psychological preparation for peak performance in sports competition. J Educ Pract 2016; 7(12): 47-50
9. Fletcher D, Sarkar M. A grounded theory of psychological resilience in Olympic champions. Psychol Sport Exerc 2012; 13(5): 669-78
10. Lazarus RS, Folkman S. Cognitive theories of stress and the issue of circularity. In: Appley MH, Trumbull R (eds). Dynamics of stress: Physiological and social perspectives. Boston, MA: Springer US; 1986. p. 63-80
11. Nicholls AR, Polman RC. Coping in sport: A systematic review. J Sports Sci 2007; 25(1): 11-31
12. Draper G, Wright MD, Ishida A, et al. Do environmental temperatures and altitudes affect physical outputs of elite football athletes in match conditions? A systematic review of the 'real world' studies. Sci Med Football 2023; 7(1): 81-92
13. Pavlidis G, Gargalianos D. High performance athletes' education: Value, challenges and opportunities. J Phys Educ Sport 2014; 14(2): 293-300
14. Allen MS, Frings D, Hunter S. Personality, coping, and challenge and threat states in athletes. Int J Sport Exerc Psychol 2012; 10(4): 264-75
15. Morgan K. Athletics challenges: A resource pack for teaching athletics. Abingdon: Routledge; 2013

16. Sim YK, Shin JH, Kim SE, et al. Causal relationships among perception of errors, challenges, and deliberate practice in athletes with disabilities. Front Psychol 2024; 15: 1466848
17. McMullen J, Bui P, Brezovszky B, et al. Mathematical game performance as an indicator of deliberate practice. Int J Serious Games 2023; 10(4): 113-30
18. Chow D, Lu SH, Kwek T, et al. Improving responses to challenging scenarios in therapy: A randomized controlled trial of a deliberate practice training program. Train Educ Prof Psychol 2024; 19(1): 1-13
19. Horrocks DE, McKenna J, Whitehead AE, et al. Preparation, structured deliberate practice and decision making in elite level football: The case study of Gary Neville (Manchester United FC and England). Int J Sports Sci Coach 2016; 11(5): 673-82
20. Ericsson KA, Harwell KW. Deliberate practice and proposed limits on the effects of practice on the acquisition of expert performance: Why the original definition matters and recommendations for future research. Front Psychol 2019; 10: 2396
21. Altay B, Baştuğ G, Arıkan İİ. Goal commitment and psychological resilience among cycling athletes. Eur J Phys Educ Sport Sci 2018; 5(2): 303-10
22. Berki T, Piko B, Page RM. Sport commitment profiles of adolescent athletes: Relation between health and psychological behaviour. J Phys Educ Sport 2020; 20(3): 1392-401
23. Yoon YK, Jeon JY. Psychological capitals acquisition through Asian Games participation for national women football players. Korean J Sport Sci 2015; 26(2): 368-78
24. Cheon SM, Kim BJ. The development and characteristics of super psychological skills in elite athletes. Korean Soc Sport Psychol 2019; 30(1): 129-48
25. Cotterill ST. Preparing for performance: Strategies adopted across performance domains. Sport Psychol 2015; 29(2): 158-70
26. Kline RB. Principles and practice of structural equation modeling. New York: Guilford Publications; 2023
27. Nunnally J. Psychometric theory. (No title provided); 1994
28. Gentry M, Owen SV. Secondary student perceptions of classroom quality: Instrumentation and differences between advanced/honors and nonhonors classes. J Secondary Gifted Educ 2004; 16(1): 20-29
29. Lee SH, Che YJ. The effects of students' perceptions of classroom on self-regulations strategy use, persistent intention, and achievement in a context of online science gifted education program. J Gifted/Talented Educ 2016; 26(2): 365-87
30. Sim YK, Seo EC. Item goodness-of-fit of deliberate practice scale applying the Rasch model: For Taekwondo athletes. J Sport Leisure Stud 2020; 82: 313-21
31. Vallerand RJ, Mageau GA, Elliot AJ, et al. Passion and performance attainment in sport. Psychol Sport Exerc 2008; 9(3): 373-92
32. Yang MH. The relationship between autonomous coaching behavior and deliberate practice and athlete satisfaction: The mediating role of self-determined motivation. J Coaching Dev 2015; 17(3): 77-91
33. Klein HJ, Wesson MJ, Hollenbeck JR, et al. The assessment of goal commitment: A measurement model meta-analysis. Organ Behav Hum Decis Process 2001; 85(1): 32-55
34. So YH. A structural analysis of achievement goal orientation, perception of classroom goal structures, goal commitment, self-regulated learning, and mathematics achievement outcome. Korean J Child Educ 2010; 19(3): 41-56
35. Anderson JC, Gerbing DW. Structural equation modeling in practice: A review and recommended two-step approach. Psychol Bull 1988; 103(3): 411-23
36. Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: New procedures and recommendations. Psychol Methods 2002; 7(4): 422-45
37. Vella SA, Cliff DP, Okely AD, et al. Instructional strategies to promote incremental beliefs in youth sport. Quest 2014; 66(4): 357-70

38. Burke DT, Al-Adawi S, Lee YT, et al. Martial arts as sport and therapy. J Sports Med Physic Fitness 2007; 47(1): 96-102
39. Dictionary of Sport and Exercise Science. Over 5,000 Terms Clearly Defined. London: A & B Black, 2006
40. Kalina RM. Teoria sportów walki. Warszawa: COS; 2000. Polish
41. Ashkinazi S, Jagiełło W, Kalina RM, et al. The importance of hand-to-hand fights for determining psychomotor competence of antiterrorists. Arch Budo 2005; 1(1): 8-12
42. Harasymowicz J, Kalina RM. Training of psychomotor adaptation – a key factor in teaching self-defence. Arch Budo 2005 2005; 1(1): 11-24
43. Kalina RM, Jagiełło W, Wiktorek P. Motor competence in self-defence of students of a detectives' school during their course of studies. Arch Budo 2007, 3(3):1-6
44. Shishida F. Why can a little lady throw down a strong man using only a finger? The mechanism of soft atemi-waza. In: Kalina RM (ed.) Proceedings of the 1st World Congress on Health and Martial Arts in Interdisciplinary Approach, HMA 2015, 17–19 September 2015, Czestochowa, Poland. Warsaw: Archives of Budo; 2015: 49-58
45. Kalina RM, Jagiełło W, Chodała A. The result of "testing fights in a vertical posture" as a criterion of talent for combat sports and self-defence – secondary validation (part II: the accuracy). Arch Budo Sci Martial Art Extreme Sport 2016; 12: 163-180
46. Kruszewski A, Cherkashin I, Cherkashina E. Wrestling – antique lineage of modern form of combat sports. Arch Budo Sci Martial Arts Extreme Sport. 2020; 16: 45-51
47. Kruszewski A. From Ancient Patterns of Hand-to-Hand Combat to a Unique Therapy of the Future. Int J Env Res Pub He 2023; 20: 3553
48. Kruszewski A. Wrestling fight – between tradition, sport and spectacle. Arch Budo 2023; 19: 21-27
49. Litwiniuk, A, Gąsienica-Walczak B, Jagiełło W, et al. Body balance disturbation tolerance skills combat sports athletes and people with other motor experiences in dynamically changing circumstances in own research – a perspective for predicting personal safety during real-life performance in extreme situations. Arch Budo 2023; 19: 41-49
50. Hofman R, Collingwood TR. Fit for duty. Champaign IL: Human Kinetics.1995
51. Sadowski J, GierczukD, Miller J, et al. Success factors in elite WTF taekwondo competitors. Arch Budo 2012; 8(3): 141-146
52. Jinyoung Yang, TaeHee Lim, OhJung Kwon et al. Structural relationship among resilience, psychological skills and performance of taekwondo sparring athletes. Arch Budo 2019; 15: 45-56
53. Kruszewski A, Kruszewski M, Kuźmicki S, et al. Directions of changes in match structure in female wrestling based on World Wrestling Championships 2014 and The Olympic Games 2016 observations. Arch Budo Sci Martial Art Extreme Sport 2019; 15: 45-52J et al.
54. Kruszewski A, Cherkashin I, Kruszewski M et al. Differences between technical activities used by male and female wrestlers competing in Seniors European Wrestling Championships (Roma, 10-16 February 2020). Arch Budo 2021; 17: 109-117
55. Litwiniuk A, Grants J, Obmiński Z. Blood lactate concentrations after losing or winning a boxing match in junior athletes. Arch Budo 2022; 18: 347-351
56. Rigdon EE. CFI versus RMSEA: A comparison of two fit indexes for structural equation modeling. Structural Equation Modeling: A Multidisciplinary Journal 1996; 3(4): 369-379

Authors:

Hyun-Ryun Kim: https://orcid.org/0009-0004-7096-8372

Youngjun Hong: https://orcid.org/0009-0002-6779-5146

Seung-Hwan Woo: https://orcid.org/0000-0003-2876-6633

Snagil Lee: https://orcid.org/0000-0002-7994-2855

Jae-Pil, Seo: https://orcid.org/0009-0003-4526-2020

**Citation:** Kim HR, Hong Y, Woo SH, et al. The mediating effect of challenge on the relationship between competition preparation, deliberate practice, and goal commitment in combat sport athletes. Arch Budo J Inn Agon 2025, 21: 157-171